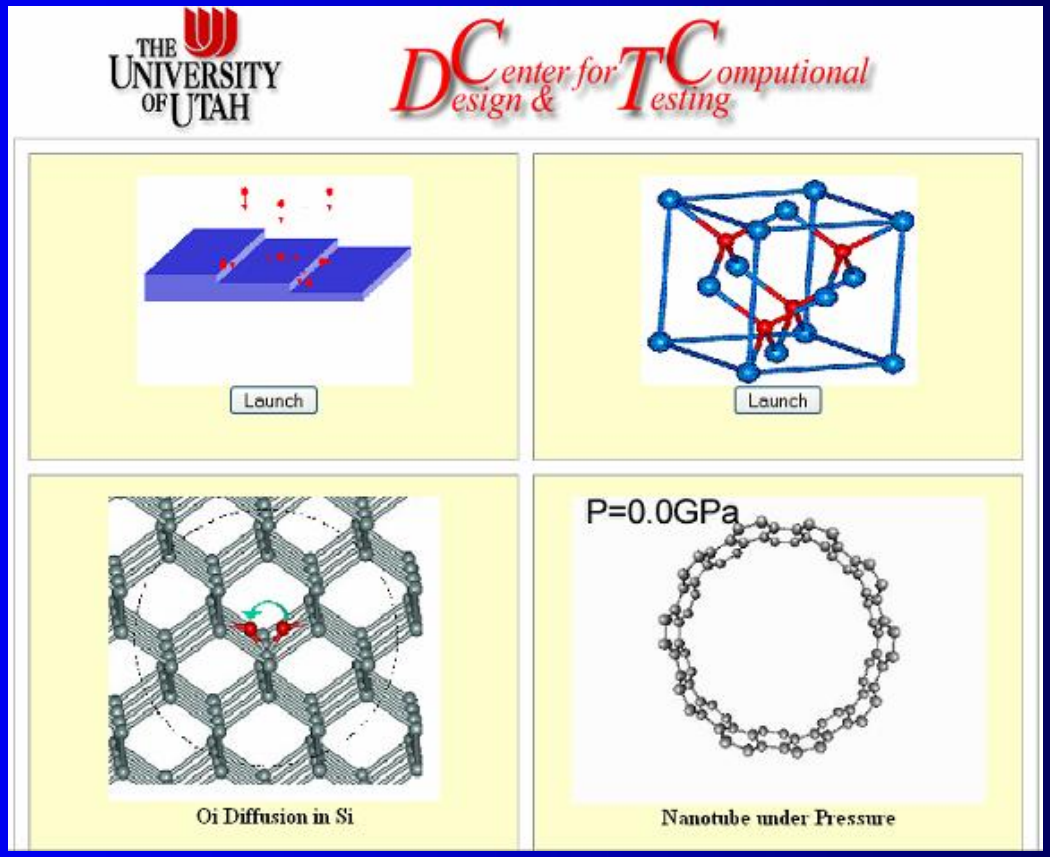
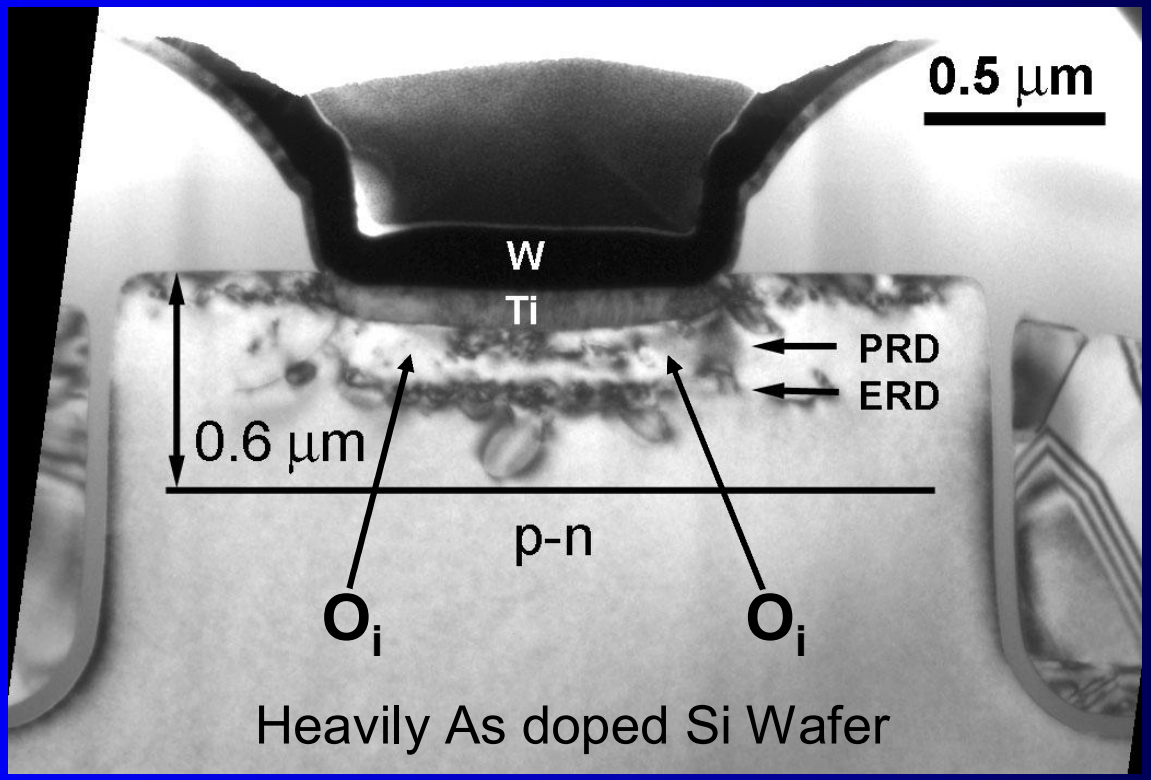
Center for Computational Design and Testing (CCDT)

Feng Liu, Materials Science & Engineering



Fairchild: characterization of O_i precipitation in As++/N-channel Power Trench MOSFETs



O_i Defects in the active region causes IDSS leakage !

O_i diffusion in heavily As doped Si ?

Characterization of O_i Diffusion in As++ Si

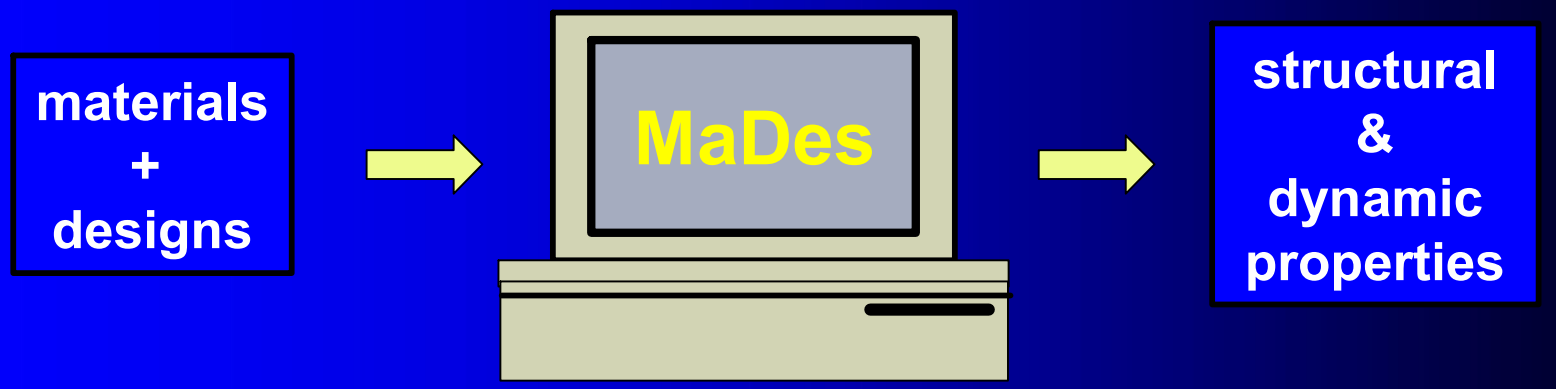
- **Experimental Characterization:**
  - **SIMS/TEM (> $1M)**
  - **Takes ~1-2 years**
  - **Costs >0.5M dollars**

- **Computational Characterization:**
  - **PC clusters (~$50K)**
  - **Takes 2-3 months**
  - **Costs ~$10K**

Mission

To develop computational technologies for industrial design and testing of novel materials and devices

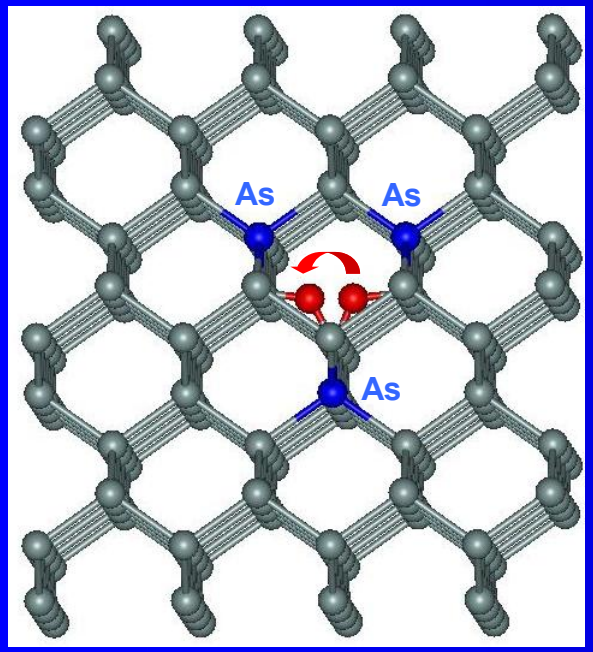
Products:

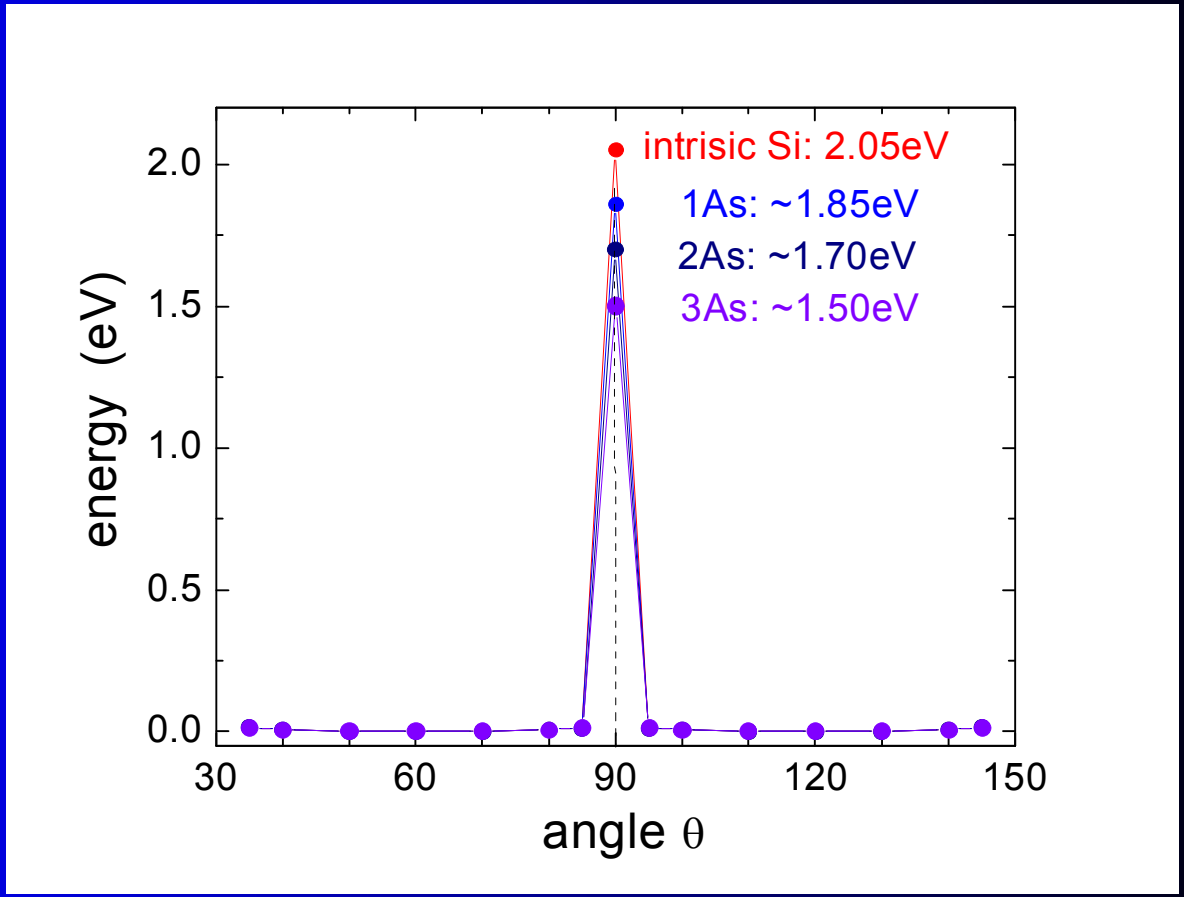


MaDes = Material Designer

DeSim = Device Simulator

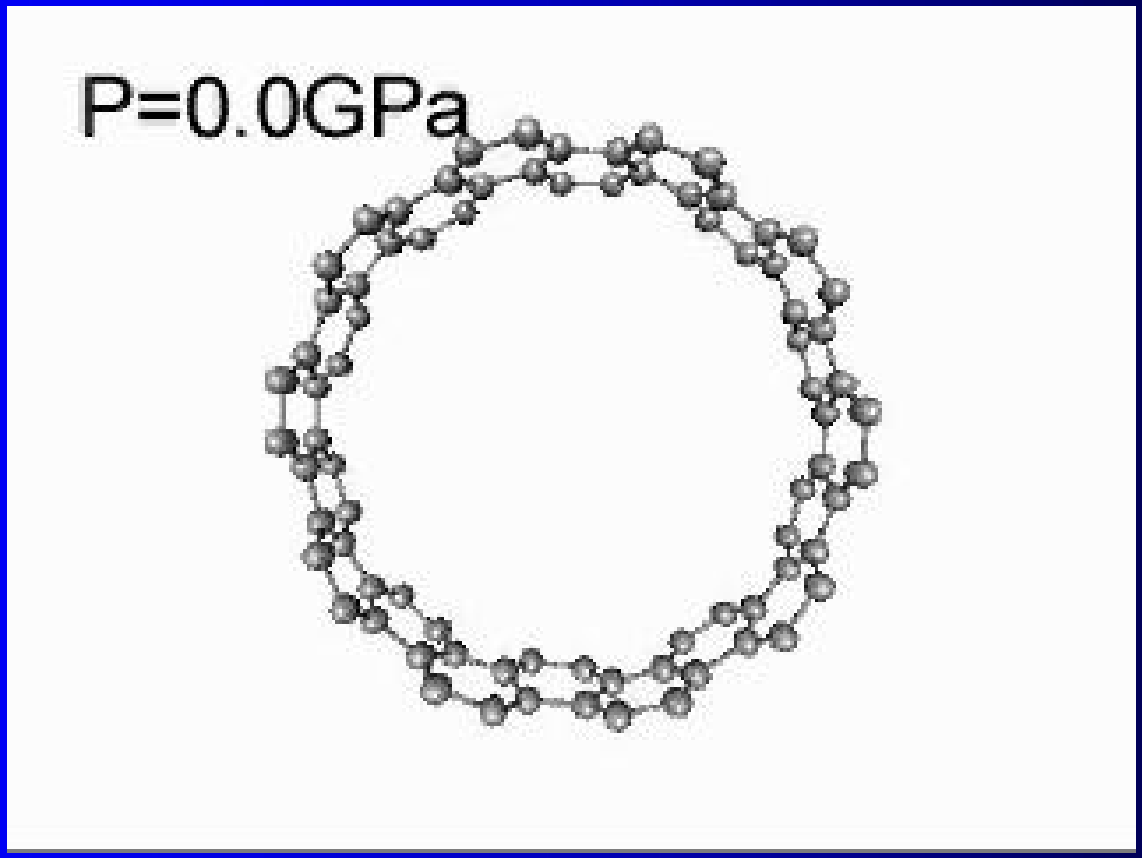
MaDes: characterization of O_i diffusion in Si for Si Wafer processing





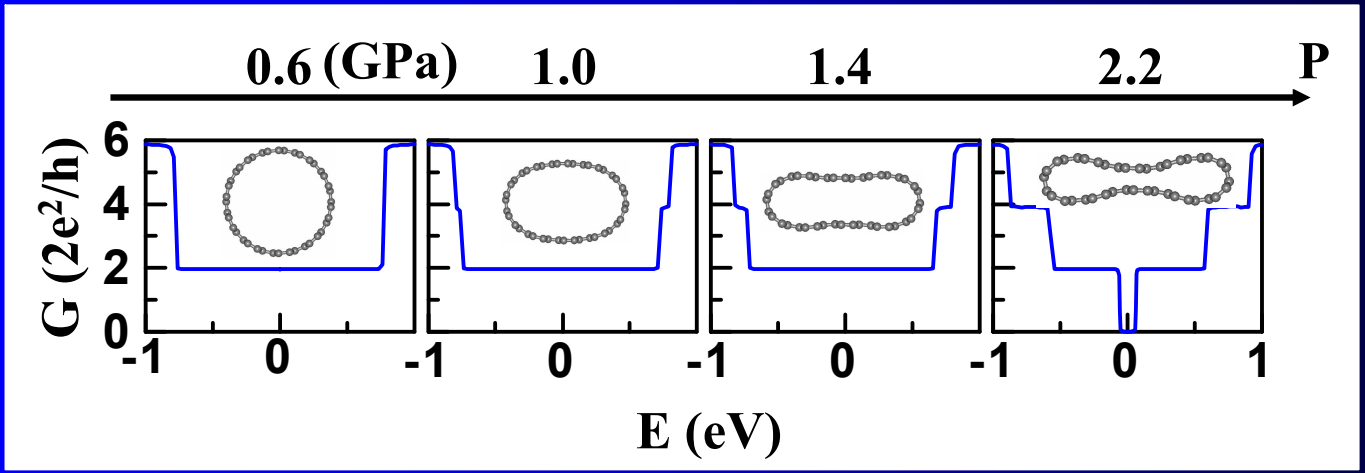
(Fairchild)

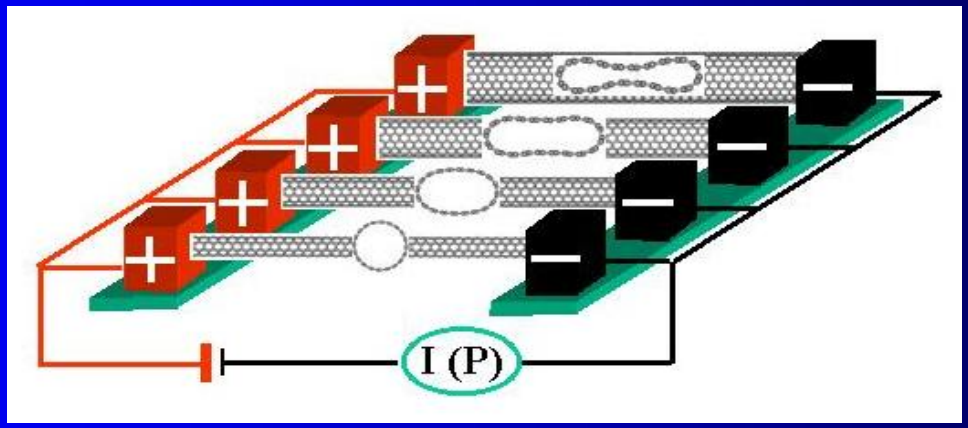
MaDes: carbon nanotube under pressure



T = 300K

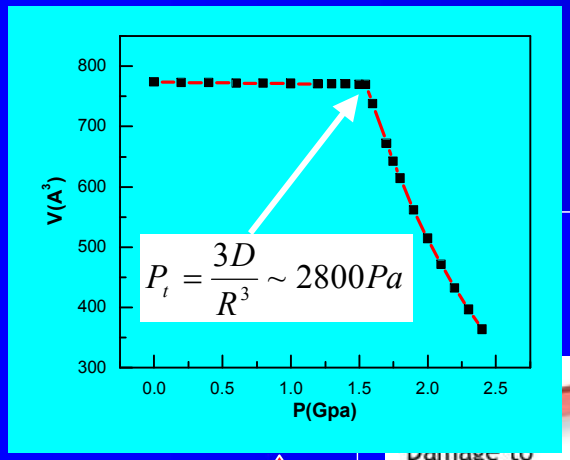
DeSim: Nano Pressure Sensor

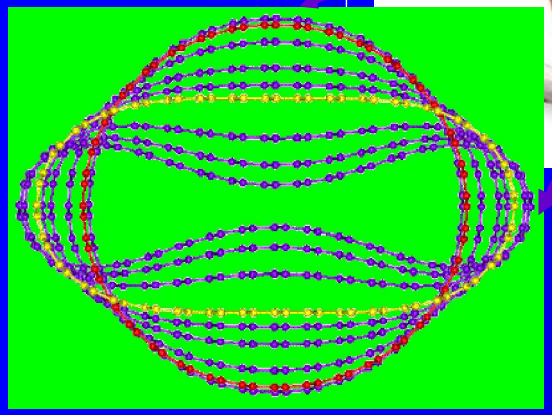


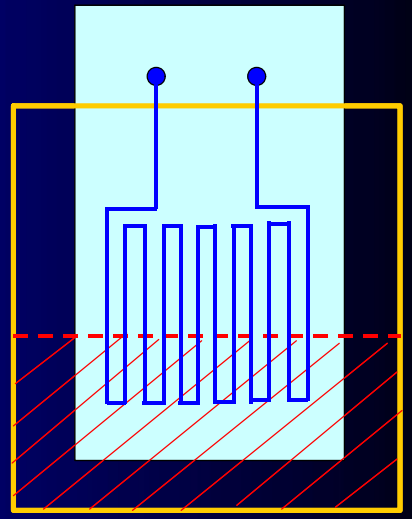


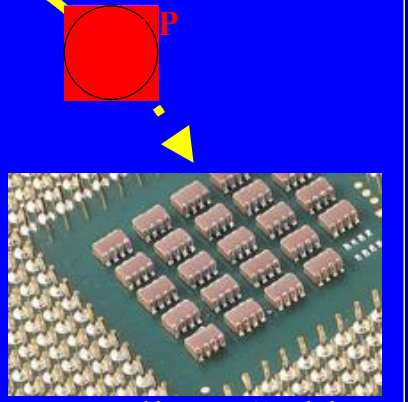
(patented)

In Situ Continuous Intraocular Pressure Monitor

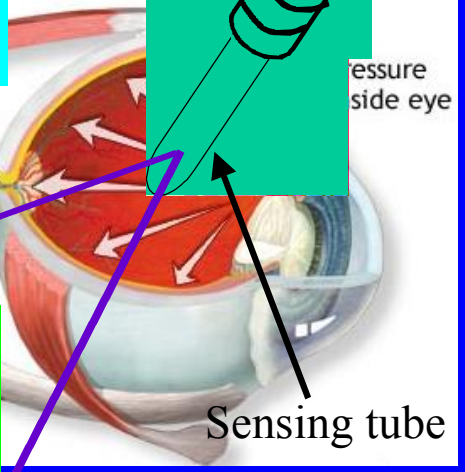








recording IC chip



transducer

P

(disclosed)

Tech Inventions and Milestones

Computational software:

- MaDes & DeSim (disclosed, 2002)
- Web interface for on-line computing (2003)

Computational application and service:

- "In Situ Continuous Human Organ Pressure Monitor" (disclosed, 2003)
- "Carbon Nanotube Electromechanical Pressure Sensor" (Patent, 2004)
- "Interstitial O diffusion in heavily As-doped Si" (Contract From Fairchild, 2005)

Commercialization Strategy

Get Help !!!

Marketing Plan

- Catalyze a startup local business venture (VISCO) for VC investment & management.
- Obtain industrial contracts for material/device design and characterization (Fairchild)
- License and sell IPs (software and patents)
- Provide consulting for computational design and testing

Marketing: industrial partners

- **Fairchild Semiconductors:**
  A leading Si wafer supplier and the largest semiconductor firm in Salt Lake area
- **PiezoMax Technologies:**
  One of only two companies worldwide selling carbon nanotube AFM tips.
- **VISCO (Visual Interactive Scientific Computing):**
  A spin-off from the center
- **ON International (v-SPRING):**
  Ongoing discussion and negotiation

Financial Support

Fund from State:

$190 K (2002-2004)

Fund from Federal Agencies:

$1.5M (2002-2004)

Fund from Industry:

$30 K (Fairchild, 2005)

$??? K (ON International, negotiating)

Computational R&D:

- ➡ Save Time and Money !